

ABSTRACT OF THE DISCLOSURE

[59] The invention concerns a time-of-flight mass spectrometer for the analysis of a large number of samples on a sample carrier using laser desorption and associated analytical procedures. The invention uses a special beam focusing system for the pulsed laser beam in a time-of-flight mass spectrometer to generate a firm pattern of focal points, inserts a pattern of samples on a sample carrier into the pattern of focal points, and focuses the ions generated in the laser focal points by an ion-optical imaging system onto one or more ion detectors in such a way that the samples in the focus pattern are measured simultaneously or quasi-simultaneously. The pattern of pulsed focal points can be created simultaneously through spatially splitting the beam, or by a temporal sequence of different deflections towards the firm locations of the pattern.